

The impact of anisometropic amblyopia on children's quality of life and mental health: A case-control study

Amblyopia and quality of life in children

Fatma Sumer¹, Merve Yazici², Seher Sumer³¹ Department of Ophthalmology, Faculty of Medicine, Recep Tayyip Erdogan University, Rize² Department of Child and Adolescent Mental Health and Diseases, Faculty of Medicine, Recep Tayyip Erdogan University, Rize³ Department of Family Medicine, Istanbul Training and Research Hospital, Istanbul, Türkiye

Abstract

Aim: We aimed to compare children with anisometropic amblyopia with their healthy peers in terms of quality of life and mental disorders and to identify possible psychosocial difficulties in children with amblyopia.

Materials and Methods: This prospective case-control study included 95 children aged 5-12 years with unilateral anisometropic amblyopia between December 2023 and December 2024. Sociodemographic data form, Pediatric Quality of Life Inventory (PedsQL), and Strengths and Difficulties Questionnaire (SDQ) were applied to participants.

Results: Mean age was 8.31 years in the patient group and 8.55 years in controls ($p=0.058$). The amblyopia group showed significantly lower scores in PedsQL total score, physical health, and psychosocial health subscales, as well as higher scores in the SDQ peer problems subscale compared to controls.

Discussion: Children with amblyopia demonstrated impaired quality of life in both physical and psychosocial domains and experienced greater peer relationship difficulties. Ophthalmologists should be aware of these psychosocial impacts for early detection and intervention.

Keywords

amblyopia, quality of life, behavioral problems, emotional problems, peer relations

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Corresponding Author: Fatma Sumer, Department of Ophthalmology, Faculty of Medicine, Recep Tayyip Erdogan University, Rize, Türkiye.

E-mail: drfatmasumer@gmail.com P: +90 530 904 39 73

Corresponding Author ORCID ID: <https://orcid.org/0000-0002-4146-8190>Other Authors ORCID ID: Merve Yazici, <https://orcid.org/0000-0001-8217-0043> · Seher Sumer, <https://orcid.org/0009-0005-0430-3054>

This study was approved by the Ethics Committee of Recep Tayyip Erdogan University School of Medicine (Date: 2023-11-23, No: 261).

Introduction

Amblyopia affects approximately 1-4% of children and represents the leading monocular cause of visual impairment in individuals under 40 years [1]. This unilateral or bilateral visual impairment that does not improve with correction can be effectively prevented or corrected with timely interventions [2]. Vision encompasses multiple parameters, including shape recognition, motion perception, stereopsis, and contrast sensitivity [3]. Even the fellow eye in amblyopes shows inferior performance compared to normal subjects on psychophysical tests [4]. Normal binocular development requires healthy competition between eyes, and in amblyopia, the better eye's development is delayed due to a lack of competition [5].

Research demonstrates that children with amblyopia have lower self-perception and social acceptance compared to healthy peers. Birch et al. reported that amblyopic children feel less competent academically, socially, and athletically, leading to inadequacy and isolation [6]. Studies show that untreated amblyopia leads to poorer health-related quality of life, with children experiencing emotional and behavioral difficulties [7]. Treatment-related psychological effects can contribute to increased stress for children and parents [8].

We aimed to compare children with anisometropic amblyopia with healthy peers regarding quality of life and mental health, identifying possible psychosocial difficulties in this population.

Materials and Methods

This prospective case-control study was conducted at Recep Tayyip Erdogan University Training and Research Hospital following institutional ethics board approval and in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants.

The study population consisted of children aged 5-12 years diagnosed with unilateral anisometropic amblyopia between December 2023 and December 2024. Anisometropic amblyopia was defined as: (1) ≥ 2 lines difference in best-corrected visual acuity between eyes, (2) anisometropia ≥ 1.0 D spherical or cylindrical difference, (3) absence of strabismus, and (4) no significant macular pathology or media opacity.

Visual acuities were recorded using Snellen charts. Amblyopia severity was classified as mild (6/9 to 6/12), moderate (6/18 to 6/36), or severe ($<6/60$). Anterior segments were evaluated by slit lamp (Topcon SL-3C), and intraocular pressure measured by pneumotonometry (Topcon Computerized Tonometer). Cover-uncover and alternate prism cover tests excluded strabismus. Cyclopentolate hydrochloride 1% was instilled, and after 45 minutes, skiascopy and autorefractometry (Topcon Auto Kerato-refractometer) determined refractive errors. Fundoscopic examination was performed with direct ophthalmoscopy and a +90D contact lens.

Exclusion criteria included: other amblyopia types, visual acuity <0.1 in the amblyopic eye, high refractive errors, organic eye diseases, systemic diseases, psychiatric diagnosis, intraocular pressure >21 mmHg, nystagmus, previous amblyopia treatment, and strabismus. Controls were children aged 5-12 years with perfect uncorrected vision, no refractive error, and no chronic diseases.

Assessment Tools

Pediatric Quality of Life Inventory (PedsQL): A standardized 23-item instrument evaluating health-related quality of life in pediatric populations, validated in Turkish [9,10]. It covers physical health (8 items), emotional well-being (5 items), social interactions (5 items), and academic functioning (5 items), using a five-point Likert scale. Higher scores indicate better quality of life.

Strengths and Difficulties Questionnaire (SDQ): A 25-item behavioral screening tool assessing conduct problems, hyperactivity/inattention, emotional symptoms, peer relationship problems, and prosocial behavior. The Turkish adaptation demonstrates acceptable validity and reliability [11].

Statistical Methods

Data analysis was conducted using IBM SPSS Statistics Version 26.0. Normality was assessed using Kolmogorov-Smirnov and Shapiro-Wilk tests. An independent samples t-test was used for parametric comparisons, Mann-Whitney U test for non-parametric comparisons. Categorical variables were analyzed using the Pearson chi-square test, with Fisher's exact test when appropriate. Post-hoc comparisons used Bonferroni correction. P-values <0.05 were considered significant.

Ethical Approval

This study was approved by the Ethics Committee of Recep Tayyip Erdogan University School of Medicine (Date: 2023-11-23, No: 261).

Results

The study included 95 participants (55 female, 40 male) in the patient group and 93 participants (50 female, 43 male) in the control group ($p=0.568$). The mean age was 8.31 years in patients and 8.55 years in controls ($p=0.058$).

Significant differences existed in maternal ($p=0.021$) and paternal ($p=0.009$) education levels between groups, with lower education levels in the amblyopia group. No other demographic differences were observed (Table 1).

Scale score comparisons revealed significant differences in the physical health domain ($p=0.002$), with markedly lower scores in the patient group. Psychosocial health scores were also significantly lower in the amblyopia group ($p<0.001$). SDQ peer relationship scores were significantly higher in the patient group (median=3) compared to controls (median=2) ($p<0.001$), indicating greater peer difficulties. No significant differences were found in other SDQ subscales (Table 2).

Discussion

This study represents one of the few investigations focusing specifically on amblyopia diagnosis impact on children's quality of life and psychological well-being, distinct from treatment-related effects.

Our results demonstrated that amblyopic children exhibited significantly diminished health-related quality of life in physical health, psychosocial functioning, and overall scores compared to healthy controls. Additionally, peer relationship problems were significantly more pronounced, suggesting amblyopia specifically impairs social integration while not uniformly affecting all emotional and behavioral domains.

The physical health deficits likely reflect the motor-visual integration difficulties inherent in amblyopia. Reduced depth perception and impaired binocular vision affect hand-eye coordination and spatial navigation, impacting daily activities and sports participation [9]. The psychosocial impairments encompassing emotional, social, and academic functioning suggest broader developmental consequences beyond visual deficits.

Our findings align with previous research showing quality of life

Table 1. Examination of demographic characteristics according to groups

		Control (n=93)	Patient (n=95)	Test Statistic	P
	Age	9 (5.01 - 12.11)	8.31 (5 - 12.09)	-1.177	0.058 ^m
Gender	Female	50 (53.8)	55 (57.9)	0.325	0.568 ^x
	Male	43 (46.2)	40 (42.1)		
Marital Status	Divorced	3 (3.2)	3 (3.2)	-	1.000 ^f
	Togetherness	90 (96.8)	91 (96.8)		
Education Status	Primary School	26 (28)a	19 (20.2)a	9.763	0.021 ^x
	Middle School	27 (29)a	37 (39.4)a		
	High School	6 (6.5)a	16 (17)b		
	University	34 (36.6)a	22 (23.4)b		
Father's Education Status	Primary School	20 (21.5)a	18 (18.9)a	11.48	0.009 ^x
	Middle School	26 (28)a	41 (43.2)b		
	High School	4 (4.3)a	11 (11.6)a		
	University	43 (46.2)a	25 (26.3)b		
Mother Occupation	Not working	58 (62.4)	65 (69.1)	0.956	0.328 ^x
	Working	35 (37.6)	29 (30.9)		
Father Occupation	Not working	12 (12.9)	6 (6.3)	1.656	0.198 ^y
	Working	81 (87.1)	89 (93.7)		

m: Mann Whitney U test, x: Pearson chi-square test, y: Yate's correction, f: Fisher's exact test, a-b: No difference between groups with the same letter (Bonferroni corrected Z test), median (min.-max.), n (%)

impacts in amblyopic children [12, 13]. However, unlike studies examining treatment-related psychosocial effects, our research isolated the diagnosis-specific impacts by excluding children undergoing treatment. This approach eliminates confounding factors such as patching stigma or treatment burden [14, 15]. The peer relationship difficulties observed merit particular attention. Unlike strabismus, which has visible cosmetic effects potentially affecting social interactions [16], anisometropic amblyopia lacks obvious external signs. The peer problems likely stem from functional visual deficits affecting social activities, sports participation, and academic performance rather than appearance-related stigma [6].

The lower parental education levels in the amblyopia group highlight socioeconomic disparities affecting amblyopia prevalence and management. Lower socioeconomic status is associated with delayed diagnosis, reduced treatment access, and poorer adherence [17-19]. This finding suggests amblyopia disproportionately affects disadvantaged populations, potentially exacerbating existing health inequalities.

Our study's strength lies in focusing exclusively on anisometropic amblyopia, creating a homogeneous population and eliminating the confounding effects of strabismus or treatment-related factors. The exclusion of children with mental disorders and chronic illnesses from both groups enhanced comparability and reduced confounding variables.

Limitation

Several limitations should be acknowledged. First, this single-center study with a limited sample size may restrict generalizability. Multi-center studies with larger populations would enhance applicability. Second, focusing specifically on anisometropic amblyopia, while creating homogeneity, limits generalizability to other amblyopia subtypes. Third, we used a general health-related quality of life scale rather than vision-specific instruments, as validated Turkish versions of pediatric vision-specific quality of life questionnaires were unavailable.

table 2. Comparison of the scores obtained from the pedsql and sdq scales according to the groups

	Control (n=93)	Patient (n=95)	Test Statistics	pm
PedsQL				
Physical Health	84.4 (40.6 - 100)	71.88 (28.1 - 100)	-3.024	0.002
Psychosocial	87.5 (21.7 - 100)	76.6 (31.7 - 100)	-3.509	<0.001
Total	85.8 (35.9 - 100)	75 (38 - 100)	-3.868	<0.001
SDQ				
ADHD	4 (0 - 8)	4 (0 - 9)	-1.156	0.248
Affective Symptoms	2 (0 - 7)	2 (0 - 9)	-0.007	0.995
Behavioral Problems	1 (0 - 9)	1 (0 - 5)	-1.044	0.296
Peer Relationships	2 (0 - 7)	3 (0 - 6)	-3.576	<0.001
Social Relationships	8 (4 - 10)	9 (3 - 10)	-0.192	0.848
Total	9 (2 - 28)	10 (1 - 23)	-0.849	0.396

m: Mann Whitney U test, median (min.-max.)

Finally, the cross-sectional design prevents causal inferences about the relationship between amblyopia and quality of life outcomes.

Conclusion

Children with anisometropic amblyopia demonstrate significantly impaired quality of life in physical and psychosocial domains and experience greater peer relationship difficulties compared to healthy peers. These findings highlight the importance of ophthalmologists recognizing potential psychosocial impacts alongside visual deficits. Early identification and appropriate interventions addressing both visual and psychosocial aspects may be protective against negative developmental outcomes. Given amblyopia's positive response to early treatment, comprehensive management should consider quality of life impacts to optimize outcomes and prevent long-term psychosocial consequences.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and Human Rights Statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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